

wherein an azimuth of the half-wave plate within the optical recording medium is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

11. (Four Times-Amended) An optical recording medium comprising:

at least one optical recording layer including an optical recording material that changes a state of photo-induced birefringence in response to a recording light that is externally controlled from the optical recording medium to rotate a polarization angle of the recording light, a portion of the recording layer that changes a state of photo-induced birefringence substantially acting optically as a quarter-wave plate; and

an optical reflection layer formed on one surface of said optical recording layer,

wherein an azimuth of the quarter-wave plate within the optical recording medium is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

21. (Five Times-Amended) An optical recording medium, comprising an optical recording layer that includes a material having at least one of a polymer or a liquid crystal polymer in which an azimuth of birefringence that is induced by a recording light externally controlled from the optical recording medium to rotate a polarization angle of the recording light changes in response to a rotation of the polarization angle of said recording light; and

a substrate which sustains the optical recording layer,

wherein an azimuth of the optical recording layer is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

22. (Four Times-Amended) An optical recording method comprising:

controlling a polarization angle of a recording light emitted from a light source, the recording light externally controlled from an optical recording medium to rotate the polarization angle of the recording light;

illuminating the optical recording medium with said recording light; and

forming an optical element on the optical recording medium by the illumination, that acts substantially as a half-wave plate, having an azimuth corresponding to a polarization angle on the optical recording medium,

wherein the azimuth corresponding to a polarization angle on the optical recording medium is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

26. (Four Times-Amended) An optical recording method comprising:

controlling a polarization angle of a recording light emitted from a light source, the recording light externally controlled from an optical recording medium to rotate the polarization angle of the recording light;

illuminating the optical recording medium with said recording light; and

forming an optical element on the optical recording medium by the illumination, that acts substantially as a quarter-wave plate, having an azimuth corresponding to a polarization angle on the optical recording medium,

wherein the azimuth corresponding to a polarization angle on the optical recording medium is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

30. (Twice Amended) An optical recording apparatus comprising:

a light source that generates recording light;

a spatial optical modulator that controllably rotates a polarization angle of said recording light; and

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a focusing optical system that multilevel-modulates an azimuth of an optical recording layer within an optical recording medium by directing the recording light obtained through the spatial optical modulator to the optical recording medium.

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35. (Five Times-Amended) An optical recording medium, comprising an optical recording layer including an optical recording material having at least one of a polymer or a liquid crystal polymer that stores multilevel information using a light induced birefringence that acts optically as a half-wave plate, an orientation of an azimuth of birefringence formed by a recording light representing the multilevel information, the recording light externally controlled from the optical recording medium to rotate a polarization angle of the recording light; and

a substrate which sustains the optical recording layer,

wherein the azimuth of birefringence formed by the recording light is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

37. (Five Times-Amended) An optical recording medium, comprising an optical recording layer including an optical recording material having at least one of a polymer or a liquid crystal polymer that stores multilevel information using a light induced birefringence that acts optically as a quarter-wave plate, at orientation of an azimuth of birefringence induced by controllably rotating a polarization angle of a recording light externally from the optical recording medium that represents the multilevel information; and

a substrate which sustains the optical recording layer,

wherein the orientation of the azimuth of birefringence is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

39. (Five Times-Amended) An optical recording medium, comprising an optical recording layer having at least one of a polymer or a liquid crystal polymer in which an azimuth of birefringence induced by controllably rotating a polarization angle of a recording light externally from the optical recording medium is multilevel-modulated and recorded in response to a rotation of a polarization angle of said recording light; and

a substrate which sustains the optical recording layer;

wherein the azimuth of birefringence is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

40. (Four Times-Amended) An optical reproducing method comprising:

radiating a reproducing light on an optical recording medium in which an azimuth of an optical element that acts substantially as a half-wave plate is multilevel recorded in response to a polarization angle of a recording light that is externally controlled from the optical recording medium to rotate the polarization angle of the recording light; and

determining a polarization angle of the reproducing light transmitted by said optical element,

wherein the reproducing light is directed on the optical recording medium in which an azimuth of the half-wave plate within the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

43. (Four Times-Amended) An optical reproducing method comprising:

radiating reproducing light on an optical recording medium in which an azimuth of an optical element that acts substantially as quarter-wave plate is multilevel-recorded in response to a polarization angle of a recording light that is externally controlled from the optical recording medium to rotate the polarization angle of the recording light; and

determining a polarization angle reproducing light reflected from said optical element,

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wherein the reproducing light is directed on the optical recording medium in which an azimuth of the quarter-wave plate within the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

46. (Four Times-Amended) An optical reproducing apparatus comprising:

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a reproducing light optical system for transmitting reproducing light to an optical recording medium in which an azimuth of an optical element that acts substantially as a half-wave plate is multilevel recorded in response to a polarization angle of a recording light that is externally controlled from the optical recording medium to rotate the polarization angle of the recording light; and

an analyzing unit that detects a polarization angle of reproducing light transmitted by said optical element,

wherein the reproducing light is directed on the optical recording medium in which an azimuth of the half-wave plate within the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

49. (Four Times-Amended) An optical reproducing apparatus comprising:

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a reproducing light optical system for emitting reproducing light toward an optical recording medium in which an azimuth of an optical element that acts substantially as a quarter-wave plate is multilevel recorded in response to a polarization angle of a recording light that is externally controlled from the optical recording medium to rotate the polarization angle of the recording light; and

an analyzing unit that detects a polarization angle of reproducing light reflected by an optical reflection layer and transmitted by said optical element,

wherein the reproducing light is directed on the optical recording medium in which an azimuth of the quarter-wave plate within the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

52. (Four Times-Amended) An optical recording and reproducing apparatus comprising:

- a light source that generates a recording light;
- a polarization rotary device that rotates a polarization angle of said recording light;
- a focusing optical system that irradiates an optical recording medium with said recording light obtained from said polarization rotary device;
- a reproducing light optical system that irradiates said optical recording medium with reproducing light; and
- an analyzing unit that detects a polarization angle of reproducing light acted on by said optical recording medium,

wherein the reproducing light is directed onto the optical recording medium after the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

53. (Four Times-Amended) A method for optically recording and reproducing information, comprising:

- controlling a polarization angle of a recording light emitted from a light source, the recording light controlled externally from an optical recording medium to rotate the polarization angle of the recording light;
- illuminating the optical recording medium with said recording light;
- forming an optical element on the optical recording medium by the illumination having an azimuth corresponding to a polarization angle on the optical recording medium;
- radiating reproducing light on the optical recording medium; and

determining a polarization angle of reproducing light acted on by said optical element,

wherein the reproducing light is radiated onto the optical recording medium after the azimuth of the optical recording element has been multilevel-modulated so that recorded information can be reproduced.

54. (Four Times-Amended) A device for optically recording and reproducing information, comprising:

controlling means for controlling a polarization angle of a recording light emitted from a light source, the recording light controlled externally from an optical recording medium to rotate the polarization angle of the recording light;

forming means for forming an optical element on the optical recording medium by the illumination having an azimuth corresponding to a polarization angle on the optical recording medium;

illumination means for radiating reproducing light on the optical recording medium; and

determining means for determining a polarization angle of reproducing light acted on by said optical element,

wherein the reproducing light is directed onto the optical recording medium after the azimuth corresponding to the polarization angle on the optical element has been multilevel-modulated so that recorded information can be reproduced.

55. (Five Times-Amended) An optical recording medium, comprising an optical recording layer having at least one of a polymer or a liquid crystal polymer in which an optical element is formed by a recording light that is externally controlled from the optical recording medium to rotate a polarization angle of the recording light, the optical element having an azimuth of birefringence and acting on reproducing light to adjust a polarization